REMARKS

Claims 1-23 are pending in this application. Claims 1 and 8-10 are independent claims. Claims 2-7 and 11-23 are dependent claims.

Claims 1-4, 7-14, 18-20, and 23 have been rejected.

The Examiner objected to claims 5, 6, 15-17, 21, and 22 as being dependent upon rejected base claims, but indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

Objections to the Claims

On page 2 of the Office Action, the Examiner objected to claim 19 because the Examiner believes "ladar" should be changed to "radar." Applicants respectfully traverse the objection to claim 19. The present invention relates to both radar and laser radar ("ladar") systems. Claim 18 is directed to the transmitter and the receiver operating at radar frequencies. Claim 19 is directed to the transmitter and the receiver operating at ladar frequencies. Support for a ladar system is found in Fig. 3 and in paragraph [036] on page 14 of the specification.

Accordingly, Applicants respectfully request withdrawal of the objection to claim 19.

Rejections Under 35 U.S.C. § 103(a)

On pages 2-3 of the Office Action, the Examiner rejected claims 1 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Shpantzer et al. (U.S. Patent Application No. 2002/0186435) in view of Wooten (U.S. Patent No. 6,493,473). Also, on pages 3-4 of the Office Action, the Examiner rejected claims 2-4, 7-9, 11-14, 18-20, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Shpantzer in view of Wooten and Born ("Principles of Optics," Third (revised) Edition, 07/27/01). Applicants respectfully traverse these rejections for the reasons presented below.

Claims 1, 8, and 10

Claim 1 recites a polarimeter comprising a receiver configured to "receive a first polarization (P1) of a signal and to split the first polarization of the signal into the in-phase (I_{P1}) and quadrature (Q_{P1}) components; and receive a second polarization (P2) of the signal and to split the second polarization of the signal into the in-phase (I_{P2}) and quadrature (Q_{P2}) components." Independent claims 8 and 10 recite similar language.

The Examiner stated on page 2 of the Office Action that "Shpantzer does not explicitly disclose splitting the first and the second signal into the in-phase and quadrature components." The Examiner has relied upon the Wooten reference as disclosing "a splitter for splitting a signal." However, Wooten does not disclose splitting the first and second polarizations of the signal into the in-phase and quadrature components, as recited in claim 1.

Referring to the embodiment of the invention as shown in Fig. 1, the receiver 102 includes a polarizer/orthomode 108 that divides the signal 105 into orthogonally polarized signals P1 and P2. A receiver/demodulator 110 receives the first polarized signal P1, where a splitter 124 splits the polarized signal P1 into the in-phase component I_{P1} and the quadrature component Q_{P1}. A receiver/demodulator 112 receives the second polarized signal P2, where another splitter splits the polarized signal P2 into the in-phase component I_{P2} and the quadrature component Q_{P2}. Thus, the polarizer 108 divides the incoming signal 105 into two orthogonal polarizations, while the splitter 124 operates as a phase splitter to separate each of the two orthogonal polarizations P1 and P2 into the respective in-phase and quadrature components.

The abstract of the Wooten reference states that a "polarization splitter splits light having an input polarization into beams having substantially orthogonal polarizations." The polarization splitter of Wooten is a polarizer, not a phase splitter. In fact, the terms "in-phase" and "quadrature" are not found in Wooten. Thus, Wooten does not disclose splitting the first and second polarizations of the signal into the in-phase and quadrature components, as recited in claim 1.

Therefore, Applicants submit that claims 1, 8, and 10 patentably distinguish over the prior art.

Claim 9

Independent claim 9 recites determining the Stokes polarization vector components (s_0, s_1, s_2, and s_3) according to the following equations:

$$s_0=a_{P1}^2+a_{P2}^2; \quad (1)$$

$$s_1=a_{P1}^2-a_{P2}^2; \quad (2)$$

$$s_2=2a_{P1}a_{P2}\cos\delta; \text{ and} \quad (3)$$

$$s_3=2a_{P1}a_{P2}\sin\delta; \quad (4)$$

given:

$$\delta=\delta_{P1}-\delta_{P2}; \quad (5)$$

$$\delta_i=\tan^{-1}(Q_i/I_i); \text{ for i=P1, P2; and} \quad (6)$$

$$a_i^2=I_i^2+Q_i^2; \text{ for i=P1, P2.} \quad (7)$$

As described in paragraph [006] on page 2 of the specification, an elliptically-polarized wave can be considered as the superposition of two waves of arbitrary orthogonal polarization and amplitude a_1 and a_2 with phase difference δ. As recited in the Born reference, the components of a Stokes polarization vector (s_0, s_1, s_2, and s_3) may be equated to the amplitudes of the two waves (a_1 and a_2) and the phase difference (δ), as defined by equations 8 through 11 below:

$$s_0=a_1^2+a_2^2; \quad (8)$$

$$s_1=a_1^2-a_2^2; \quad (9)$$

$$s_2=2a_1a_2\cos\delta; \text{ and} \quad (10)$$

$$s_3=2a_1a_2\sin\delta; \quad (11)$$

However, rather than using two waves as defined by the Born reference, the present invention uses four signals (I_{P1}, Q_{P1}, I_{P2}, and Q_{P2}) to determine the Stokes vector components according to equations 1 through 7 above, which are recited in claim 9 (and also recited in independent claim 8).

When the four in-phase and quadrature components are used to determine the Stokes vector components, the phase δ_{P1} (see equation 6 above) of the first polarization signal relative to a reference oscillator is calculated as the arctangent of the ratio of its quadrature component to its in-phase component, and the phase δ_{P2} of the second orthogonal polarization is calculated

in a similar way. The phase difference δ (see equation 5 above) between the two polarizations is then the difference of these two phases δ_{P1} and δ_{P2}.

None of the cited references describes the phase calculations of equations 5 and 6 above and how the Stokes vector components can be calculated from the in-phase and quadrature components of two orthogonally polarized signals.

Therefore, Applicants submit that claim 9 (and also claim 8) patentably distinguishes over the prior art.

The dependent claims depend from the above-discussed independent claims and are patentable over the prior art for at least the reasons discussed above.

Therefore, Applicants submit that claims 1-4, 7-14, 18-20, and 23 patentably distinguish over the prior art. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under § 103.

Request for Examiner Interview Prior to Next Office Action

If any of the claims continue to be rejected over Shpantzer in view of Wooten and Born after reconsideration of the claims, the Examiner is respectfully requested to contact the undersigned by telephone to arrange an Examiner Interview prior to issuance of the next Office Action.

Conclusion

In accordance with the foregoing, it is submitted that all outstanding objections and rejections have been overcome and that all pending claims patentably distinguish over the prior art. Thus, the application is submitted to be in condition for allowance. Reconsideration of the claims is respectfully requested.

If any formal matters remain after this Response, the Examiner is requested to telephone the undersigned to discuss these matters.

Finally, please charge any additional fees associated with the filing of this response to Deposit Account No. 501121.

Respectfully submitted,

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